CHICAGO FORECAST DISTRICT.

During the early part of the month exceptionally warm weather prevailed throughout the greater portion of the district, the September maximum temperature record being broken at many stations. The break in the hot wave of the 7th, 8th, and 9th was successfully forecast, and the work of the Weather Bureau at the time was strongly commended by the Chicago Press.

Warnings were issued well in advance of all frosts of a serious character, September 18th, 19th, 25th, 28th, and 29th. The area covered by the killing frosts on the mornings of the 29th and 30th was closely outlined in the forecasts issued the previous days. It is not known what value these frost warning were, as nearly all crops liable to damage had been harvested.

In the squall of the 24th an unseaworthy steamer, *Cleveland*, was sunk at the entrance to the Chicago Harbor, and the tug *Dorr* sprung a leak and foundered a few miles off south Chicago.

During the 26th a storm developed in the British Northwest, and on the morning of the 27th the center was near Winnipeg. During the succeeding twenty-four hours it moved across the upper Lake region with increasing intensity. Southwest signals were ordered up September 27th at 10 a. m., on Lakes Michigan and Superior, Mackinac section, and Lake Pepin. On the evening of the 27th the signals were extended over Lake Huron. The following morning the signals on Lakes Michigan and Superior were changed to northwest. This was the first severe and general storm of the season in this section, and its movement was marked by high winds at all upper Lake ports. On account of the signal orders and warnings having been issued well in advance of the storm's movement, all vessels had an opportunity to run to shelter in harbor or seek protection under a lea shore.

A long range forecast for Duluth and vicinity for September 12th to 15th, inclusive, was issued at Chicago at 2 p. m., September 11th, in answer to a request from Mr. H. W. Richardson, Local Forecast Official. An excellent opportunity for making a long range forecast presented itself, as the weather map indicated a continuance of settled conditions. That the forecast was of value and much appreciated by the people of Duluth was shown by comments in the Duluth Evening Herald of September 18.—*H. J. Cox, Professor.*

SAN FRANCISCO FORECAST DISTRICT.

The weather has been generally clear over the entire district. Light rains occurred on the coast in northern California on September 4, and thunderstorms occurred in eastern Arizona on September 8. Rain fell on the northern coast of California on September 28, and it is interesting to note that this first rain of the winter type was forecast. The beginning of the month was unusually cold and cloudy in the fruit drying districts of California, and raisin makers felt somewhat anxious for their crops. On September 6, from some studies made at Mount Tamalpais, a forecast of warm weather for forty-eight hours was made in the interest of the raisin makers, and on succeeding dates similar forecasts were issued. These were all verified. The curing season up to date has been very favorable.

The month has been marked by a great frequency of fog along the coast. Here again the conditions on Mount Tamalpais have been used in the practical work of forecasting. It has been noted that when the vertical thermal gradient is one degree rise for every 60 or 80 feet the conditions are favorable for heavy fog in the Bay of San Francisco and outside the heads. A number of minor accidents occurred to vessels during the month on account of the fog.

On September 22 there was a sudden rise in temperature (19° in twenty minutes) at San Diego. This was the warmest day of the season. It was not forecast. The phenomenon is probably connected with the wind from the desert.

Several times during the month the determination of the conditions at a height of about 4,000 feet above sea level by means of kites, and on three occasions all night records, were obtained.—*Alexander G. McAdie, Forecast Official.*

PORTLAND, OREG., FORECAST DISTRICT.

No wind signals were displayed during the month.

No formal frost warnings were issued during the month, though information was given in the synopsis that frosts were probable in certain sections. Light frosts did occur but no damage was done.

Rain warnings were issued on several dates, and as a rule they were fully verified. Mr. George H. Greer, a large farmer of Dundee, Yamhill County, Oreg., writes under date of September 16, 1899, as follows:

> The farmers were eager to learn what your Bureau thought of the weather. Your remarkably accurate and far reaching view was very truly a comfort, especially from Tuesday to Friday (12th to 15th.)

The August rains were unusual and when in September rain began to fall considerable anxiety was caused in the business community as well as among the farmers. The forecasts and synopses were read with more than ordinary interest, and the information issued from this office allayed the fear which prevailed that the fall rains had set in.

Special crop reports were issued during the month in connection with the synopses on the morning maps; evening newspaper reports were given when occasion required. The value of the work of the Bureau to the farmers and to the business people has been demonstrated more clearly during the last two months than ever before.—*B. S. Pague, Forecast Official.*

WEST INDIAN FORECAST DISTRICT.

The month opened with a tropical cyclone southeast of Santiago, Cuba. Advisory information regarding the disturbance, received the evening of August 31, was given wide dissemination. The following message was received from Washington the evening of the 1st:

> Storm center 4 p. m. south of and near Santiago, moving west-northwest; slightly increased energy. Vessels sailing from Cuban ports and those west from Santo Domingo and Haiti should take every precaution.

This information was telegraphed to all regular and display stations on the Island of Cuba and to Santo Domingo, and to all newspapers that could be reached.

At 1:44 p. m. of the 2d the following was received from Washington:

> Tropical storm near Windward Passage; continued strong northeast winds on Florida and north Cuban coasts for a day or two; high seas.

The following was received from Washington at 9 p. m.:

> Storm apparently recurved and central north of Santo Domingo and Haiti, moving northward; little energy. Caution advised vessels sailing in that direction; stations notified.

This information was communicated to all interests.

The Barbados morning report of September 7 showed disturbed conditions to the northeastward of that station. A report from Barbados, timed 12:20 p. m., contained the following:

> Barometer irregular; unusual increase in height of sea on east coast.

The morning reports of September 8 showed the storm to be central southeast of St. Kitts and a maximum wind velocity of 30 miles was reported, the only high wind.

The following was received from Washington at 11:59 a. m.:

Hurricane signal has been ordered at St. Kitts; storm central east of that island apparently moving northwest.

Advisory messages had been sent direct to all stations from Washington, and the usual disposition of such messages was made locally. The morning reports of September 9 showed the storm center to the northeast of Porto Rico, and conditions indicated the passing of the hurricane to the north-northwest. By the morning of the 10th the hurricane had progressed so far northward that all West Indian stations were beyond its influence.—*W. B. Stockman, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

During September there were nine highs and ten lows sufficiently well defined to have their paths traced on Charts I and II.

The accompanying table presents the principal points regarding the first and last appearance, and velocity of these conditions, and the following statement is added:

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a. m.	47	129	5, p. m.	45	59	3,300	4.5	733	30.5
II	3, a. m.	35	128	11, a. m.	47	59	4,680	8.0	585	24.4
III	4, p. m.	54	117	8, p m.	32	79	3,240	4.0	810	33.7
IV	8, p. m.	48	120	18, a. m.	41	68	3,440	9.5	362	15.1
V	11, p. m.	40	126	17, p. m.	34	101	3,900	6.0	650	27.1
VI	17, a. m.	51	116	23, a. m.	36	83	3,780	6.0	630	26.3
VII	20, a. m.	49	113	25. a. m.	47	55	2,820	5.0	564	23.5
VIII	20, p. m.	47	127	29, p. m.	46	57	4,440	9.0	493	20.5
IX	26, p. m.	42	126	*5, a. m.	38	73	4,260	8.5	251	10 4
Total							33,860	60.5	5,078	211.5
Mean of 9 paths							3,762		564	23.5
Mean of 60.5 days									560	23.3
Low areas.										
I	†30, p m.	45	122	5, a. m.	48	51	3,540	5.5	644	26.8
II	2, p. m.	44	119	7, a. m.	48	55	3,840	4.5	853	34.5
III	4, a. m.	48	128	9, a. m.	49	53	3,480	5.0	696	29.0
IV	8, p. m.	50	114	12, a. m.	41	70	2,520	3.5	720	30.0
V	10, p. m.	54	106	14, p. m.	46	57	3,660	4.0	915	38.1
VI	11, p. m.	47	121	14, p. m.	40	103	1,440	3.0	480	20.0
VII	14, p. m.	53	112	17, p. m.	48	75	2,040	3.0	680	28.3
VIII	17, p. m.	27	84	21. p. m.	51	64	2,340	4.0	585	24.4
IX	21, p. m.	53	116	27, a. m.	48	70	3,480	5.5	633	26.4
X	25, p. m.	55	116	30, p. m.	50	66	2,460	5.0	492	20.5
Total							28,800	43.0	6,698	279.0
Mean of 10 paths							2,880		670	27.9
Mean of 43.0 days									670	27.9

*October. †August.

Highs.—Numbers II, V, and IX were first noted on the middle Pacific coast; Nos. I, IV, and VIII, on, or near the north Pacific coast, and the remaining three to the north of Montana. The general tendency of the paths is toward the east, or south of east. No. V was last seen in the panhandle of Texas; No. VI in east Tennessee; No. III off the south Atlantic coast; Nos. IV and IX off the middle Atlantic coast; the remaining highs disappeared near Newfoundland. An interesting fact connected with these highs is the very large number of days covered by them, 60.5. This is the largest number of days noted in the past three years.

Lows.—Of the lows, Nos. I, II, III, and VI were the first noted on or near the north Pacific coast; No. VIII was first seen off the west coast of Florida; the remaining storms moved east or northeast, and all were last seen over Newfoundland or near the mouth of the St. Lawrence, except No. IV, which disappeared off the middle Atlantic coast. The month was remarkable for its light winds. On the p. m. of 11th, as storm No. V approached the lower lakes, New York reported an easterly gust of 60 miles an hour. On the afternoon of 24th, while storm No. IX was over Lake Huron, Cleveland reported a southeast wind of 40 miles, and the next morning Buffalo had a south wind of 48 miles. On the morning of 28th, as storm No. X approached the upper lakes, Chicago reported a west wind of 48 miles; as the same storm passed down the St. Lawrence Valley on the evening of 30th, it caused a northwest wind of 42 miles at New York City.—*H. A. Hazen, Professor.*

RIVERS AND FLOODS.

The low water season is at hand, and the river stages as a rule steadily declined throughout the month. There was a temporary sharp rise in the rivers of the South Atlantic States on the 11th and 12th, due to heavy local rains, but nothing of interest transpired.

The highest and lowest water, mean stage, and monthly range at 123 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

Heights of rivers referred to zeros of gages, September, 1899.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn	1,954	14	7.5	1	4.5	30	5.6	3.0
Reads Landing, Minn	1,884	12	4.7	2,3	2.2	30	3.5	2.5
La Crosse, Wis	1,819	12						
North McGregor, Iowa	1,759	18	4.9	6-8	3.1	30	4.2	1.8
Dubuque, Iowa	1,699	15	4.6	7-9	3.1	30	4.0	1.5
Leclaire, Iowa	1,609	10	2.6	10-12	1.7	1	2.3	0.9
Davenport, Iowa	1,593	15	3.7	10,11	2.6	1	3.3	1.1
Muscatine, Iowa	1,562	16	4.7	10,11	3.2	1	4.2	1.5
Galland, Iowa	1,472	8	1.8	11-15	1.1	1	1.6	0.7
Keokuk, Iowa	1,463	14	2.8	12,13	1.5	1,2	2.3	1.3
Hannibal, Mo	1,402	17	3.8	{13-16} {18,19}	2.4	1,2	3.4	1.4
Grafton, Ill	1,306	23	4.8	20	3.2	1,2	4.1	1.6
St. Louis, Mo	1,264	30	7.5	1,2	5.0	29,30	6.3	2.5
Chester, Ill	1,189	30	5.3	1-3	3.2	30	4.3	2.1
Memphis, Tenn	843	33	5.5	1	2.2	30	3.3	3.3
Helena, Ark	767	42	9.2	1	4.6	30	6.0	4.6
Arkansas City, Ark	635	42	10.0	1	4.0	23-26,30	5.6	6.0
Greenville, Miss	595	42	8.5	1	3.7	30	5.2	4.8
Vicksburg, Miss	474	45	9.6	1	2.3	30	4.5	7.3
New Orleans, La	108	16	4.6	1	3.3	21,29,30	3.9	1.3
Missouri River.								
Bismarck, N. Dak	1,309	14	3.7	1	2.0	28-30	2.8	1.7
Pierre, S. Dak	1,114	14	4.3	1	2.5	28	3.3	1.8
Sioux City, Iowa	784	19	7.9	2	5.0	29	6.0	2.9
Omaha, Nebr	669	18	8.4	1,3	6.7	30	7.6	1.7
Plattsmouth, Nebr	641							
St. Joseph, Mo	481	10	4.3	1	1.2	30	2.5	3.1
Kansas City, Mo	388	21	10.0	1	5.9	30	7.6	4.1
Boonville, Mo	199	20	9.3	1	5.7	30	7.0	3.6
Hermann, Mo	103	24	8.6	1	5.3	30	6.7	3.3
Illinois River.								
Peoria, Ill	135	14	4.3	18,19	3.7	1-3,5	4.0	0.6
Youghiogheny River.								
Confluence, Pa	59	10	4.4	12	0.4	7	1.3	4.0
West Newton, Pa	15	23	4.5	12	0.1	6-8	0.8	4.4
Allegheny River.								
Warren, Pa	177	7	0.3	2	0.0	7-30	0.0	0.3
Oil City, Pa	123	13	1.4	3	— 0.1	1	0.3	1.5
Parkers Landing, Pa	73	20	1.3	3	0.0	1	0.7	1.3
Monongahela River.								
Weston, W. Va	161	18	— 0.6	{12, 13} {21, 22}	— 1.6	10	—1.1	1.0
Fairmont, W. Va	119	25	0.8	13, 14	0.3	1-7	0.5	0.6
Greensboro, Pa	81	18	9.2	11	6.4	1-3,6-8	6.8	2.8
Lock No. 4, Pa	40	28	11.0	12	6.1	1,21,22	7.7	4.9